AD-A045 441 FINE (SIDNEY A) ASSOCIATES INC WASHINGTON DC F/G 5/1
RELIABILITY STUDY OF FUNCTIONAL JOB ANALYSIS TASK STATEMENTS.(U)
JUL 77 M ZEPP, A BELENKY, T ROSEN DOT-CG-65083A
UNCLASSIFIED USCG-D-58-77 NL

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Report No. CG-D-58-77

(14)

RELIABILITY STUDY OF FUNCTIONAL JOB ANALYSIS TASK STATEMENTS.

BY

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WASHINGTON, D. C. 20009

(12) 41p.

(11) JULY 1977

(9) FINAL REPORT.

(15) DOT-CG-65083A

(18) USCG (19) D-58-77

Prepared for

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD
Office of Research and Development
Washington, D.C. 20590

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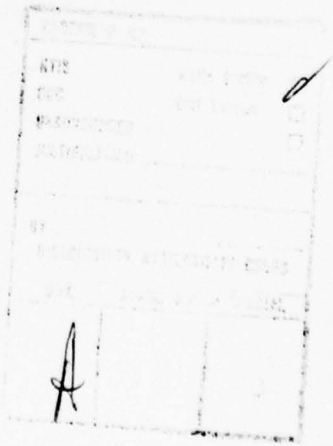

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
CG-D-58-77		

4. Title and Subtitle	5. Report Date
RELIABILITY STUDY OF FUNCTIONAL JOB ANALYSIS TASK STATEMENTS	July 1977
	6. Performing Organization Code
	8. Performing Organization Report No.
7. Author(s)	
M. Zepp, A. Belenky, T. Rosen	
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Sidney A. Fine Associates, Inc. 1870 Wyoming Avenue, N. W. Washington, D. C. 20009	G-DSA 3301.70.2.1
	11. Contract or Grant No.
	DOT-CG-65083 A
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Department of Transportation U. S. Coast Guard Headquarters Office of Research and Development Washington, D. C. 20590	Final Report
	14. Sponsoring Agency Code
	G-DSA-1/TP44

15. Supplementary Notes

The U. S. Coast Guard Office of Research and Development's technical representatives for the work performed herein were Mr. Richard Bartel and Dr. John S. Gardenier.

16. Abstract

The reliability of the Functional Job Analy[illegible]ks contained in the task bank is the most critical factor in determining [illegible]sefulness to the Coast Guard. Reliability is based on the agreement of 75% or more of the ratings as determined by two independent groups of raters: one group trained in Functional Job Analysis techniques and knowledgeable of the systems under study and one group trained under Functional Job Analysis techniques and not knowledgeable of the system. The latter group establishes the reliability of the tasks written and edited by the former group. Reliability on this study was found to be 98.1%. Beyond the criteria which affect the reliability study, additional constructive criticism is offered. The detailed recommendations appear on the comment sheet attached to each individual task statement. These task statements and comment sheets were submitted as appendices to the draft report on March 1977 and are currently in the possession of the U. S. Coast Guard.

17. Key Words	18. Distribution Statement
Functional Job Analysis, Reliability Task Analysis, Ratings	Document is available to the U. S. Public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	36	

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METRIC CONVERSION FACTORS

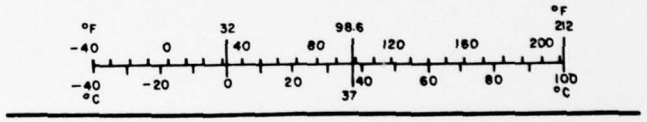
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	*square inches*	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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E	Towboat Operators
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G	Personnel Handling High Pressure-Ambient Temperature Hazardous Cargo on an Unmanned Barge

1. BACKGROUND

The Coast Guard has developed a Task Bank of tasks performed by bridge, cargo, and engineering personnel of commercial vessels with a view towards using the data contained therein to develop licensing programs that insure the highest degree of safety in ship operation.[1] Functional Job Analysis (FJA), a method developed by Sidney A. Fine, was used to produce the Task Bank of some 800 tasks.

FJA is both a conceptual system and a method of analysis. Central to the method of analysis is the role of language, since all data (whether obtained from observation, interview, or written material) is converted to language. Hence reliability is completely dependent on how the analytic information is expressed. Thus, FJA methodology is centered on controlling the language used to describe work. It does so by using the structure of the sentence as the vehicle for communicating the information (see Fig. 1), and by defining a vocabulary of functional activity (see Fig. 2). A task statement is formulated in response to five questions:

- Who? (Subject) The subject of a task statement is understood to be simply *worker*. The task statement does not define what kind of worker.
- Performs what action? (Action verb) A task statement requires a concrete, explicit action verb. Verbs which point to a process (such as develops, prepares, interviews, counsels, evaluates, and assesses) should be avoided or used only to designate broad processes, methods, or techniques which are then broken down into explicit action verbs.

[1] The Task Bank was developed under contract DOT CG-4-903A by professional researchers at Operations Research, Inc., Silver Spring, Md. These workers had received one week's training in Functional Job Analysis from Dr. Fine after which they began an actual task analysis drawing on experience, existing literature, and observations in the field.

MODEL SENTENCE WORKSHEET FOR TASK STATEMENT

Analyst_____

Who?	Performs what action?	To whom or what?	Upon what instructions? (Source? How specific?)	Using what tools, equipment, work aids?	To produce/ achieve what? (expected output)
Subject	Action verbs	Object of verb	Phrase	Phrase	In order to...
the worker					

Task statement:

FIGURE 1

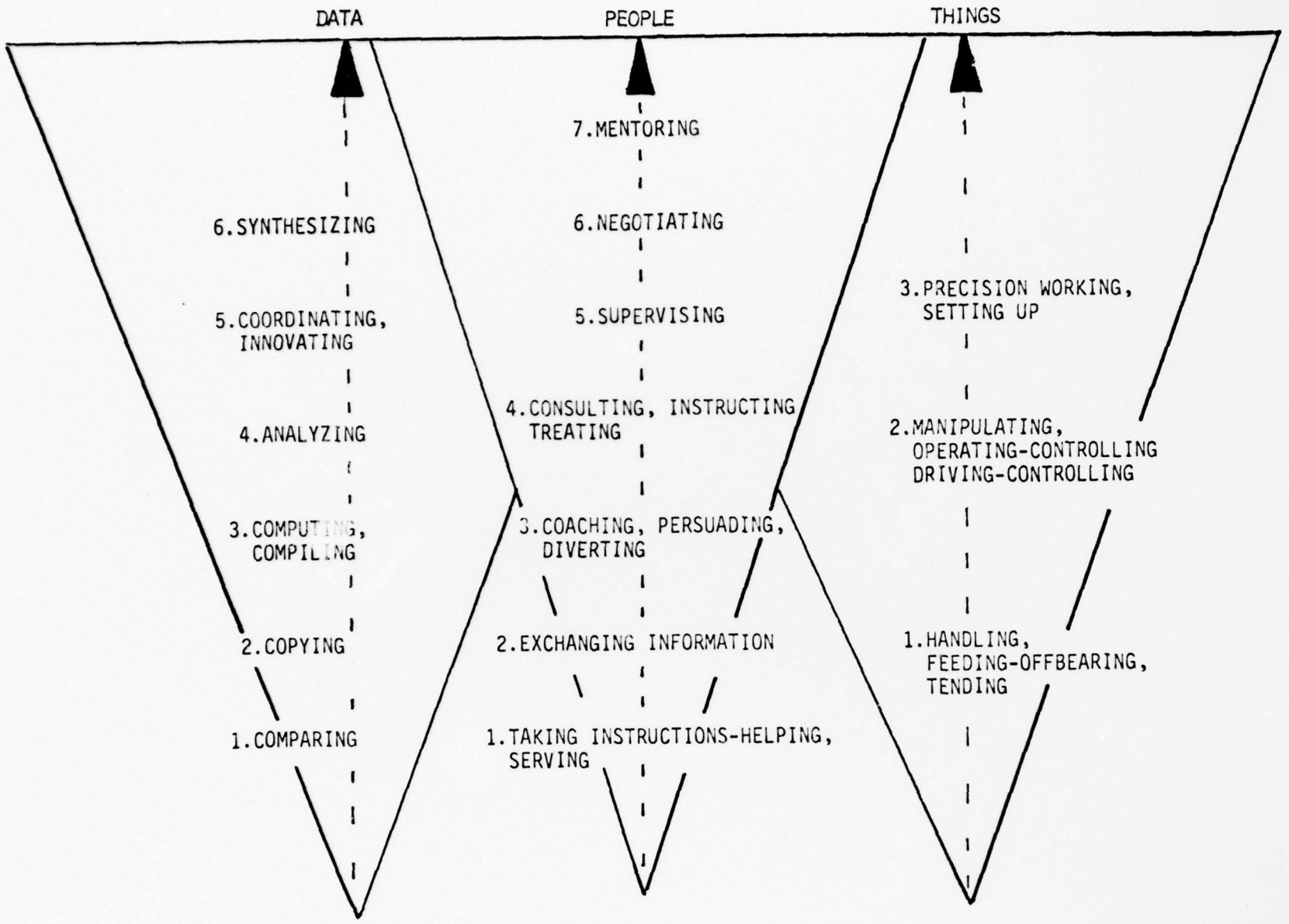

FIGURE 2-OVERVIEW OF WORKER FUNCTION SCALES

- To accomplish what immediate result? The purpose of the action performed must be explicit so that (1) its relation to the objective is clear and (2) performance standards for the worker can be set.

- With what tools, equipment, or work aids? A task statement should identify the tangible instruments a worker uses as he performs a task; for example, telephone, typewriter, pencil/paper, checklist, written guides, etc.

- Upon what instructions? A task statement should reflect the nature and source of the instruction the worker receives. It should indicate what in the task is prescribed by a superior and what is left to the worker's discretion or choice.[2]

Tasks formulated in this manner and responsive to these questions provide the information necessary to consistently and reliably determine the complexity el of difficulty) and orientation (worker involvement as a perso he task and to develop performance standards and training content. Each of the elements of the task analysis reinforces the others. The interrelationships among the parts is illustrated by this paradigm: In Order To *Perform This Task* - as described by the task statement and supported by the ratings - *To These Standards*, the *Worker Needs This Training*. (See Fig. 3).

The reliability of FJA task statements is determined by establishing agreement among analysts on the ratings made from seven Guttman type (ordinal) scales containing six to eight levels. The seven scales measure functional performance as such performance relates to Things, Data, People, Prescription/Discretion, Reasoning, Math and Language.[3] In addition, an

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[2]Fine, Sidney A. and Wiley, Wretha, Introduction to Functional Job Analysis, Kalamazoo, Michigan: W. E. Upjohn Institute for Employment Research, 1971, pp. 10-11.

[3]Fine, Sidney A., Functional Job Analysis Scales, Kalamazoo, Michigan: W. E. Upjohn Institute for Employment Research, 1973.

PARADIGM

Data	People	Things	Data	People	Things		Reas.	Math.	Lang.	
W.F. - LEVEL			W.F. - ORIENTATION			INSTR.	G. E. D.			TASK-NO.
5B	1A	1A	80%	10%	10%	4	4	1	4	S.D.4

GOAL:

OBJECTIVE:

TASK:

Decides on/makes changes, modifications, or adjustments to work schedules, time frames, and task assignments, considering individual capabilities, work loads of workers, nature of work, priorities, in order to plan re-delegation/re-distribution of tasks when original assignment cannot be met.

TO DO THIS TASK

PERFORMANCE STANDARDS

Descriptive:

.All adjustments are clear and concise.
.Instructions are thorough and clear.
.Tasks are fairly distributed to workers.
.Completes task according to schedule.

Numerical:

.Tasks are re-assigned X time prior to expected performance.
.Over period of time less than X number of complaints from office staff because of problems with work overload, or poor understanding of expectations.

TO THESE STANDARDS

TRAINING CONTENT

Functional:

.How to schedule and re-distribute task assignments, considering resources and constraints.

Specific:

.Knowledge of schedules and task assignments and capabilities of staff.
.Knowledge of work to be done.

WORKER NEEDS THIS TRAINING

FIGURE 3

estimate of the Worker Function Orientation which measures the relative importance in the task of the performance standards relating to Things, Data, and People, is also made. (However, the Orientation assignment is not an important consideration in the usual reliability study.) Agreement is judged to be satisfactory when a minimum of 75% of the ratings (there are seven ratings per task) are the same or no more than one scale level different between independent ratings of individual FJA analysts. Significant differences between analysts or groups of analysts are evidence of an unreliable task statement indicating the need for further information, greater specificity, and improved clarity in the form of the task statement.

The reliability of the task statements is the most critical factor determining their value to the Coast Guard and to the industry. It is essential that a between-groups reliability study be completed before further use is made of FJA under contract CG-41-903A. That is, ratings assigned by FJA analysts knowledgeable of the specific content in the tasks must be compared to ratings determined by FJA analysts who are not familiar with the specific content of the tasks. This reliability data is necessary to evaluate the usefulness of FJA for future contract work and correct any deficiencies which may exist in the past and current application of FJA. Results from such a study may improve considerably the cost effectiveness and reliability of further research. In order to provide this data, Sidney A. Fine Associates, Inc. contracted to conduct a Reliability Study.

2. PROCEDURE

a) Reliability

The tasks in the Task Bank had been written and analyzed by FJA analysts who were knowledgeable about the specific content of the tasks. In the reliability study; the tasks were rerated by FJA analysts from Fine Associates who

has not been involved in the development of the Task Bank and who were not familiar with the specific nature of the work analyzed. The analysts studied some background material to acquaint them with the technical terminology employed by the Coast Guard. They were then provided with a complete set of the task bank of 822 tasks with all the ratings blanked out. Each of three raters was provided with a portion of the blanked task bank. At the end of pre-arranged periods of time (a week or ten days) the material was exchanged for another portion on which that rater had not yet worked. Therefore, two analysts independently rated each task in the Task Bank. These two ratings were compared and where disagreements occurred, a third analysts also rated the task. Differences in the ratings were resolved through a group discussion and by arriving at a consensus. Only then were the Associates' agreed on ratings for the seven scales compared and evaluated against the original ratings to calculate the reliability and to identify and determine the nature of any differences between them.

The seven ratings referred to are those which appear in Figure 3 on page 5 of this report. These seven ratings deal with the involvement of the task with Data, People and Things, the scale of Worker Instructions (the mix of prescription/discretion) and the General Educational Development represented by the Reasoning, Math and Language scales. They do not include the orientation ratings. The seven scales accurately measure the levels necessary to carry out the paradigm represented in Figure 3: To do this task to these standards, the worker needs this training. In assessing the reliability of the tasks, the same seven scale ratings assigned to a task should be assigned by an independent group of raters. A difference of only one level in any of the scales is not significant and therefore constitutes agreement.

The differences between the Associates ratings and the original raters

were of three sorts. The first related to the central focus of this study, namely differences in ratings. The second involved noting, in the process of reviewing the ratings, some departures from the principles and techniques of FJA Methodology. Finally, sometimes the information in the task "sentence", performance standards, and the training content was ambiguous or inconsistent, blurring the meaning/intent of the task. The latter two differences could occur even when ratings were the same as between the Associates and the original raters.

These three kinds of differences were dealt with as follows in making changes. Sometimes the Associates new ratings of the seven scales not only resulted in changes of two or more levels but also had the effect of creating differences in the orientation pattern, that is, the relative involvement with Things, Data, and People*. (These orientation changes were not part of the reliability count.) Such changes were discussed by the Associates and if the ambiguities were cleared up among them, the original ratings were accepted. In the other two instances apparent inconsistencies or ambiguities in the information or inadequate support for the ratings were noted and changes made.

There are some basic guidelines used in performing an FJA study. One key item to look for is a range of no more than one level difference between Data, Worker Instructions and Reasoning.[1] These three items are very closely related and a rating of 4 on Data, 6 on Worker Instructions and 5 on Reasoning, for example, indicates that the original rater may not fully understand the principles of FJA.

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* Orientation categories are High, Medium and Low. High includes a range of 90% to 65%; Medium includes a range of 60% to 35%; Low includes a range of 30% to 5%.

1. Fine, Sidney A., Ann M. Holt and Maret Hutchinson. Functional Job Analysis: How to Standardize Task Statements, the W. E. Upjohn Institute for Employment Research, October 1974, pp. 17, 26.

Another item to watch is a rating of 2 on the People scale.[2] A 2 rating represents an exchange of information. If the task statement, performance standards and training content make no mention of any exchange of information between the worker and another person, a rating of 1A or 1B is correct.

Both of the above are worthy of mention here even though the difference between the original ratings and the new ratings may be only 1 level; the point is that some 1 level differences are a little more important than others. These are some of the items addressed in the report. However, a reliability of 98.1% was achieved based on only the 2-level differences. That is, differences in ratings of only one scale level or within the same orientation category which were consistent with the methodology of the task were accepted. (See Table 1, page 12.)

In examining the scale level differences we (the independent raters) must ask ourselves what it is about the task statement that caused us to rate it differently. This is where our group discussion comes in as outlined on page 7. Sometimes the group discussion elicits the realization that a word or phrase in the task statement was ambiguous or too general in nature which led to some disagreement on our part. If we are able to identify and clarify this ambiguity and agree that the original rating was reasonable, no changes were made. In some cases we made suggestions as to how to clarify the wording to more accurately match the rating. In other cases we may have felt that the rating was not accurate and needed to be changed.

The criterion of 75% reliability is basically founded on an examination of the seven scales; the general orientation assigned to the task by the raters is not rigidly scrutinized in a reliability study.

2. Fine, Sidney A. Functional Job Analysis: A Desk Aid, the W. E. Upjohn Institute for Employment Research, April 1973, p. 6-8.

In initially assigning a percentage to reflect the overall orientation of the task, the general guidelines are reflected in the footnote on page 8 of the report. In checking the completed task bank, a slight shift in percentages which does not alter the basic assignment within the range of High, Medium or Low would be considered insignificant.

To summarize, according to the basic guidelines for establishing reliability, 98.1% of the ratings met the criterion of difference of no more than 1 level. This 98.1% should be compared to the established rule that 75% agreement means reliability has been achieved.

2) Additional Comments

After rating the tasks which were in disagreement (two levels different on any of the seven scales), the Associates also re-examined those tasks which contained one or more one-level differences. After some discussion during which the criticality of safety factors in the performance standards and training content was considered at length, it was decided to provide the Coast Guard with a much more detailed analysis applying harsher criteria. Some of the tasks with one level differences were then added to the original group of task statements which were "not in agreement". However, these are not included in the calculation of reliability.

All parts of the tasks, including the orientation, were examined in detail. By the time the task had been sifted through a second time, the Associates found they had pulled out a total of 188 of the 822 tasks which were found to have some type of problem which suggested changes or comments. These additional data are included in Tables 2 and 3 in Section 3, Results.

Appendices A-G* include all those tasks which required clarification, rewriting, or other changes. To facilitate the comparison of the differences

* See Table of Contents, p. ii, for full titles of the appendices which were delivered in March 1977 to the Coast Guard.

between the original ratings and the Associate's ratings, only those tasks which have changes are included. Both sets of ratings appear on each task. Explanations of the differences as well as suggestions for clarification are included on a comment sheet which directly follows each task.

3. RESULTS

1) Reliability

As previously noted, satisfactory agreement-reliability-is achieved when at least 75% of the ratings of two independent groups of analysts are the same or no more than one scale level different. Since there are 822 tasks, the total number of ratings is 7 x 822 or 5754. Six hundred thirty four (634) tasks involving 4438 ratings were rated the same or only 1 level different; no changes were made on those tasks. One hundred seven (107) ratings were found to be in disagreement, out of a possible 5754. This yields a reliability of 98.1%.

2) Additional Comments

An additional 61 tasks were then pulled in accordance with the Associates'desire to make further constructive criticism. Of these tasks another 133 one-level rating changes were indicated (see Table 2). Suggestions for rewording also have been indicated to more clearly support the ratings. As noted, the Associates indicated suggested changes on a total of 188 task statements. Of these 188 tasks where changes were made (involving 1316 ratings) 1076 ratings were not changed. Thus, 4438 plus 1076 for a total of 5514 ratings remained unchanged. This is 95.8% of the total and represents the adjusted reliability based on scale rating changes including some 1-level changes.

The 188 tasks that the Associates suggest be changed involved 240 scale rating changes. These changes included some 1 level differences in ratings as noted in Section 2 above. These changes have been suggested when the original ratings were found to be inconsistent with the FJA methodology or the intent of the task. In addition, for about 36 of these 188 tasks there were major shifts in the orientation. On 19 tasks the original ratings were left unchanged but some verbal changes were made to suggest how the original ratings might be better supported. However, in accordance with standard procedures only those changes indicated in Table 1 need to be made. Tables 2 and 3 are additional recommendations which the Associates have made. We particularly recommend the changes indicated as "Major orientation shifts/ rewrite" appearing in Table 3.

TABLE 1

SUMMARY OF TWO-LEVEL RATING CHANGES BY APPENDIX LETTER
IN ACCORDANCE WITH ESTABLISHED RELIABILITY METHODS

	Appendix Letter							
	A	B	C	D	E	F	G	Totals
1. Two or more level ratings changed	1	30	25	30	12	5	4	107
Number of possible changes (7 per task)	245	1211	1022	1169	686	861	560	5754
Number of tasks in disagreement	1	16	15	20	6	5	4	27
Number of tasks in category	35	173	146	167	98	123	80	822
Reliability (%)	99.5	97.5	97.5	97.4	98.2	99.4	99.2	98.1

TABLE 2

SUMMARY OF ONE-LEVEL SUGGESTED CHANGES BY APPENDIX LETTER

2. One-level ratings changed	4	29	28	25	1	22	24	133
Total rating changes (Including Table 1)	5	59	53	55	13	27	28	240
*Adjusted reliability (%)	97.9	95.1	94.8	95.2	98.1	96.8	95.0	95.8

TABLE 3

SUMMARY OF OTHER CHANGES BY APPENDIX LETTER

	Appendix Letter							
	A	B	C	D	E	F	G	Totals
Number of major orientation shifts/rewrite	1	4	9	18	1	8	10	51
Number of minor orientation shifts/rewording	8	22	17	13	7	6	-	73
Total other changes	9	26	26	31	8	14	10	124

*These percentages reflect a hypothetical reliability based on two-level changes plus those one-level changes the Associates suggest be made in order to achieve PERFECT agreement on ratings.

While the level of agreement indicates the reliability of the task data, the study identified a number of trends which should be considered in evaluating the applicability of the Task Bank to meet specific needs. The comment sheet following each task statement in the appendices goes into detail.

3) Task Statement

Each task statement must include sufficient information to clearly portray the task as it is performed. Task statements should be written using clear action verbs to describe what the worker does. In reviewing the Task Bank, the Associates found that the worker actions were often described only by broad process verbs such as "tests" or "monitors" (see CO-III.D.3 and CO-II.C.5 following). In addition, some task statements tended to ignore two questions from the model sentence worksheet for task statements: "using what tools, equipment, and work aids?" and "upon what instructions?" (See Figure 1.) Answers to these questions would clarify the ambiguous verbs such as "tests" or "monitors" in terms of the level of complexity and the prescription/discretion mix required. For this study, it was possible to obtain this information from other elements of the task analysis - the performance standards and the training content. It should be stressed, however, that in order to communicate precisely about the work it is necessary to carefully read the entire task, considering the ratings, orientation assignments, performance standards and training content.

4) Worker Function Levels and Orientation

Most of the original ratings on the worker function scale level were in agreement with the Associates' ratings. However, it was noted that when the task statement referred specifically to emergency or safety procedures, the Data, Worker Instruction, and Reasoning Scale ratings tended to be higher than for a similar or comparable task. (See III.B.5 and III.B.10.) People level 2 with a 5% orientation was frequently used even though the task state-

TASK CODE: CO-III.D. 3									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
2	45	1A	5	2B	50	3	3	2	2

TASK CODE: CO-III.D. 3	GOAL: To monitor/maintain the LNG cargo and the cargo containment system.

OBJECTIVE: To burn cargo boil-off vapors in the vessel's propulsion/auxiliary machinery systems.

TASK: Test the boil-off piping and machinery hood ventilation system, the boil-off burning vapor detection system, and the dual-fuel burning safety shutdown devices, in order to assure that the cargo boil-off vapor burning safety system is functioning in accordance with the vessel's Operations and Safety Manual.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • The ventilation system, the vapor detection system, and the safety shutdown system are tested properly. Numerical: • In 100% of the cases, the ventilation system, the vapor detection system, and the safety shutdown system are operating within prescribed limits prior to any boil-off burning operations.	Functional: • How to energize (provide air to) and test (monitor flow conditions of) annular piping/machinery hood ventilation system. • How to energize (provide power to) the boil-off burning vapor detection system and test using test panel provided. • How to provide dummy signal to safety shutdown devices to insure that they are operating. Specific: • Knowledge of vessel's piping/machinery hood ventilation system, boil-off burning vapor detection system, and safety shutdown devices.

TASK CODE: CO-II.C.5									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
1	65	1A	5	1C	30	2	2	2	3

TASK CODE: CO-II.C.5	GOAL: To discharge LNG safely.

OBJECTIVE: To conduct pumping operations.

TASK: Monitor cargo hold inert gas system in order to ascertain whether inert gas is being recirculated through the cargo holds using the cargo hold inert gas panel following specified procedures.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Monitoring insures that recirculation and cargo hold ambient conditions are within prescribed limits. Numerical: • In 100% of the cases, cargo hold recirculation is maintained within prescribed limits.	Functional: • Understanding of principles of gas flow meters. • Understanding of analog/digital readout devices. • Understanding of need to maintain prescribed recirculation. Specific: • Knowledge of vessel's cargo hold inert gas recirculating system.

TASK CODE: III.B.5									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
1	20	1A	5	2A	75	1	1	1	2

TASK CODE: III.B.5	GOAL: Conduct hazardous pressurized liquefied chemical gas bulk cargo transfer operations safely.

OBJECTIVE: Install necessary equipment for cargo transfer operations.

TASK: Connects a water hose with pressure to the nozzle (connects hose to dockside firemain and opens firemain valve), following standard operating procedure, using available tools in order to ensure a sufficient water supply to wash away small spills of a specific pressurized liquefied gas cargo during cargo transfer operations.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Equipment is properly connected. • Arrangements completed thoroughly according to instructions. Numerical: • Water hose is connected in all cases of specific cargo transfer (e.g., alkylene oxide).	Functional: • How to connect and pressurize water hose. Specific: • Knowledge of prescribed procedures for connecting water hose. • Knowledge of water hose, firemain, piping system, etc. • Knowledge of hazardous properties of specific pressurized liquefied gas cargo (e.g., alkylene oxide's reactivity, toxicity, etc.).

TASK CODE: III.B.10									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
3B	20	1A	5	2A	75	2	2	3	2

TASK CODE: III.B.10	GOAL: Conduct hazardous chemical liquid bulk cargo transfer operations safely.
OBJECTIVE:	Install necessary equipment for cargo transfer operations.
TASK:	Connects cargo hose following standard operating procedure, using available tools and equipment, in order to connect vessel piping to shore piping for safe cargo transfer.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Equipment is properly connected. • Arrangements completed thoroughly, according to instructions. Numerical: • Cargo hose connections are properly made in all cases.	Functional: • How to read instructions for setting up equipment. • How to connect cargo hose equipment. Specific: • Knowledge of standard operating procedures for connecting cargo hose (i.e., making allowance for vessel movement, using properly gasketed flange joints and bolted tight with at least 3 bolts, properly supports hose, places pans or buckets under cargo hose connections aboard vessel, sets up shields around flanges of manifold connections to guard against cargo spray of certain chemicals such as acids). • Knowledge of specific cargo hose, cargo piping, terminal piping, etc. • Knowledge of specific chemical cargo's hazards (acidity, etc.).

ment did not describe any "exchange of information" (see CO.1.A.2 and Nuke 2.1.1.). The 5% orientation correctly reflects the fact that there is no interpersonal involvement in this task.

The orientation assignments reflect the relative involvement expressed in proportions of 100% of the work with Data (information and ideas), People (interpersonal communication) and Things (physically handling tangibles). There was a tendency for the original orientation assignment to reflect less data involvement than described or indicated by the task statement, scale ratings, performance standards and/or training content (see III-E.8). The orientation assignments also tended to reflect a confusion between things which are physcially handled, manipulated or operated and things which are a source of Data, e.g. data readouts or signals on computers or other electronic equipment.

Discrepancies of 1 level occurred frequently in the Language scale. While this is within the bounds of defined reliability, there appeared to be inconsistencies in the ratings by the original raters. The basis for the ratings appeared to be: a) procedural manuals such as the Operations and Safety Manual (see CO-III.A.1) and b) "prescribed" or "specified procedure". The original ratings were usually a level 4 or a level 3 but not consistently one or the other (see CO-I.B.14). On a fews tasks a level 2 was used for specified procedures (see CO-I.B.5). On some tasks a level 4 was assigned without firm support in the task statement (see CO-1.B.15). The Associates' ratings tended to be level 4 where specified procedures are cited. The Associates' consistencies and the original raters' inconsistencies produced many 1 level discrepancies. This was established

TASK CODE: CO-I.A. 2									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTION	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
3B	65	2	5	1A	30	3	3	1	2

TASK CODE: CO-I.A. 2	GOAL: To load LNG safely.
OBJECTIVE: To place the vessel in a condition suitable for the loading of LNG.	
TASK: Periodically, visually inspect and check the mooring system in order to insure that the vessel is moored in accordance with the mooring arrangement diagrams for the specific loading terminal, using your own judgment as to anticipated wind and sea conditions and known strength and conditions of the mooring lines.	

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Mooring lines are taut without any line being overstressed. • "Badly worn" mooring lines are not used. • Safety considerations are maximized. Numerical: • In 100% of the cases, the vessel is moored in accordance with the mooring arrangement diagram. • The mooring lines are inspected at least once every three (3) hours. • In 100% of the cases, the vessel's mooring system withstands forces caused by sudden and/or extreme changes in wind/sea conditions.	Functional: • How to evaluate by experience, weather report or barometric pressure the forces on a moored ship with respect to wind/sea conditions. • How to compensate for "aged" or "slightly worn" mooring lines. • How to recognize the different types of mooring lines as well as their individual capabilities and limitations. • How to read mooring arrangement diagrams. Specific: • Knowledge of the vessel's mooring lines. • Knowledge of the specific mooring arrangement diagram for specific loading terminal.

TASK CODE: 2.1.1

WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
5A	45	2	5	3A	50	4	5	3	4

TASK CODE: 2.1.1

GOAL: Maintain the nuclear power plant	OBJECTIVE: Perform maintenance and/or corrective repairs

TASK: When directed, performs maintenance and corrective repairs on the instrumentation and controls of the nuclear power plant systems, following required precautionary procedures in contaminated or radiation areas; using hand tools and precision measuring instruments (oscilloscopes, RMS voltmeters, etc); referring to check lists and technical manuals, interpreting drawings and specifications; and drawing from experience in order to maintain these components in good working condition.

PERFORMANCE STANDARDS	TRAINING CONTENT
DESCRIPTIVE: - Performs task expeditiously and follows precautionary procedures in hazardous areas to the letter. NUMERICAL: - 100% accurate in completing maintenance and repairs and recording the results.	FUNCTIONAL: - Knowledge of Fault-Finding Techniques - Knowledge of radiation hazard - Knowledge of instrumentation and controls - Knowledge of precision measuring instruments - Knowledge of technical manuals, drawings & specifications SPECIFIC: - Knowledge of controlled areas - How to use oscilloscopes, RMS voltmeters and other measuring equipment - Knowledge of the ship's instrumentation and controls and their maintenance manuals

TASK CODE: III.E.8									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
1A	5	1A	5	1A	90	1	1	1	1

TASK CODE: III.E.8	GOAL: Conduct hazardous pressurized liquefied chemical gas bulk cargo transfer operations safely.

OBJECTIVE: Terminate cargo transfer operations.

TASK: Operates controls to cargo hose handling equipment (dockside or barge crane) using control panel push buttons, moves and positions cargo hose, following standard operating procedure, in order to drain hose into tank barge's tanks, buckets, into shore pipeline or drainage system.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Positions cargo hose properly. Numerical: • In all cases, residual liquid cargo is drained properly.	Functional: • General knowledge of operating principles of dockside crane, boom, etc. • How to operate cargo hose handling equipment. • How to position hose for drainage. Specific: • Knowledge of specific cargo hose handling equipment, cargo tanks, shore pipelines and drainage system. • Knowledge of specific standard operating procedures.

TASK CODE: CO-III.A. 1									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
4	70	2	5	1C	25	3	4	2	4

TASK CODE: CO-III.A. 1	GOAL: To monitor/maintain the LNG cargo and the cargo containment system.
OBJECTIVE: Monitor and test the leak detection system.	
TASK: Monitor and test (check out) the vapor detection system, the hull temperature detection system, the cargo hold (interbarrier space) level detection system, and the cargo tank temperature/pressure system in order to assure that the cargo integrity is being maintained and that the leak detection system is functioning, using the cargo control and safety consoles located in the cargo control room and bridge, following specified procedures in the vessel's Operations and Safety Manual.	
PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Demonstrates awareness of the criticality of properly testing the leak detection system, in view of the danger associated with undetected LNG and vapors. • Any abnormal condition detected with an LNG cargo tank is verified and corrective action initiated. • Safety considerations are maximized. Numerical: • In 100% of the cases, the vapor detection system, the hull temperature detection system, the interbarrier space (cargo holds) level detection system, and the cargo tank temperature/pressure system are to be functioning properly.	Functional: • Understanding of principles and operations of vapor detection systems. • Understanding of principles and operations of hull temperature detection systems. • Understanding of principles and operations of cargo tank temperature/pressure systems. • Understanding of principles and operations of inter-barrier space (cargo holds) level detection system. • Understanding of the possible implications of any abnormal condition within an LNG cargo tank and the interrelationships that exist between the above four systems. Specific: • Knowledge of the vessel's Operating and Safety Manual. • How to operate the vessel's leak detection system.

TASK CODE: CO-I.B.14									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
2	20	1A	5	2B	75	3	3	2	3

TASK CODE: CO-I.B. 14	GOAL: To load LNG safely.

OBJECTIVE: To prepare personnel and equipment for LNG loading operations.

TASK: Operate spray pumps to circulate LNG through the LNG piping system, following specified procedures, in order to precool piping system.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • The lines are thoroughly inerted and precooled before vessel arrives at the loading/unloading port. • Safety considerations are maximized. Numerical: • The LNG piping system is precooled to -250°F. • In 100% of the cases, cargo handling does not commence until the LNG piping system is precooled.	Functional: • How to operate spray pumps to circulate LNG through the LNG piping system to precool the system. • How to use LNG piping system temperature indicators. • How to operate the valving system on LNG cargo tanks. • How to inert loading lines. Specific: • Knowledge of the vessel's spray pump controls, LNG piping system, and the LNG cargo tank valving system. • Knowledge of the vessel's specific cooldown procedures.

TASK CODE: CO-I.B. 5									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
1	45	1A	5	1C	50	1	2	1	2

TASK CODE: CO-I.B. 5	GOAL: To load LNG safely.
OBJECTIVE: To prepare personnel and equipment for LNG loading operations.	
TASK: Test the liquid level systems in order to ascertain whether the alarm and shutdown devices are functioning, using the liquid level panel on the cargo control console in accordance with specified procedures.	

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • High level audio and visual alarms and shutdown devices are properly tested prior to the commencement of loading operations. • Improper operation of audio and visual alarms and shutdown devices is recognized. Numerical: • In 100% of the cases, determination is made as to whether all high level audio and visual alarms and shutdown devices are functioning within prescribed limits.	Functional: • Understanding of the operation of high level sensors in activating audio and visual alarms and in initiating shutdown of the LNG cargo loading operations. • Understanding of the operations of liquid level audio and visual alarms and means to test them by initiating integral "dummy load" signals on liquid level panel to indicator lights and sounding devices. Specific: • Knowledge of the vessel's liquid level panel. • Knowledge of the vessel's liquid level alarm and shutdown device test procedure.

TASK CODE: CO-I.B. 15									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
4	75	1A	5	1C	20	5	4	3	4

TASK CODE: CO-I.B. 15	GOAL: To load LNG safely.
OBJECTIVE: To prepare personnel and equipment for LNG loading operations.	
TASK: Monitor and evaluate tank temperature readouts in order to determine whether the tank temperature gradient is within prescribed limits, using the cargo tank temperature panel.	

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Tank temperatures are effectively monitored. • Tank temperatures are precisely analyzed to determine tank temperature gradient. Numerical: • In 100% of the cases, flow operations do not commence unless the tank temperature gradient is within specified limits; i.e. tank cooldown procedure is initiated.	Functional: • Understanding of principles of cargo tank temperature sensing systems. • Understanding of operation of analog/digital temperature readout devices. • How to convert temperature readings from degrees Celsius to degrees Fahrenheit and vice versa. Specific: • Knowledge of the vessel's tank temperature monitoring system.

during review of the first 200 tasks and verified during subsequent rating. The inconsistencies can easily by cleared up by careful analysis of the basic reference materials.

The Math level produced some similar problems where only a careful study of the entire task produced any support for the original ratings (see CO-III.H.1).

5) Training Content

The training content portion of the task should contain only those items required to perform the particular task. The Associates felt that some tasks contained training content for the job as a whole, rather than for a specific task (see CO-II.C.4 and 1.4.5). This often occurs when task statements are written to cover the tasks entailed in a specific job. One possible result of this is selection of personnel who are over-qualified for the tasks at hand.

4. SUMMARY

The reliability of the ratings on the 822 tasks was very high. The Associates' impression was that most of the necessary data was available in the task analysis; the format, however, was not always consistent with the principles of FJA. If feasible, one of the original FJA analysts thoroughly familiar with the content could review the entire task bank for consistency, as it was obvious that different analysts were at work on specific sections. The Language inconsistency is a salient example. Many of the task statements can be polished by drawing on the performance standards and training content data to include a phrase or two for clarification. Suggestions along this line have been indicated on some of the comment sheets appended to the tasks in the March report. Because of the frequency of this occurrence and lack of knowledge of specific content the Associates did not feel it was within the scape of their contract to make these changes.

TASK CODE:	CO-III.H. 1

WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
3B	80	1A	5	1C	15	3	3	3	3

TASK CODE: CO-III.H. 1	GOAL: To monitor/maintain the LNG cargo and the cargo containment system.

OBJECTIVE: To dry cargo tanks with air[1] following tank inspection.

[1]Presumes inert gas generator gases used for subsequent inerting; if nitrogen is used, this evolution may be omitted.

TASK: Obtain the moisture content of each LNG cargo tank in order to determine the need for moisture removal, using the moisture content meters on the cargo control console in the cargo control room.

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • The moisture content of each LNG cargo tank is obtained properly at the prescribed time. • The need for moisture is determined accurately by thoroughly examining the moisture content meters. • Safety considerations are maximized. Numerical: • In 100% of the cases, the drying process is continued until the dew point is -49°F (-45°C).	Functional: • How to obtain the moisture content of LNG cargo tanks. • Understanding of the concepts of a dew point. • Understanding of the principles and operations of air drying systems. Specific: • Knowledge of the vessel's moisture content meters. • Knowledge of the vessel's cargo tank design with respect to moisture limits.

TASK CODE: CO-II.C.4									
WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
2	15	1A	5	2B	80	2	3	2	3

TASK CODE: CO-II.C.4	GOAL: To discharge LNG safely.
OBJECTIVE: To conduct pumping operations.	
TASK: Fully open the cargo tank discharge valves in order to attain maximum flow rate in accordance with prescribed procedures.	

PERFORMANCE STANDARDS	TRAINING CONTENT
Descriptive: • Ascertains that the LNG is being loaded at the proper full flow rate. • Safety considerations are maximized. Numerical: • In 100% of the cases, the LNG cargo loading/unloading lines and associated fittings completely contain the LNG (i.e., no leaks).	Functional: • How to operate an LNG cargo loading/unloading system, including the cargo tank fill valves, shore isolation valves, and vapor return lines. • How to operate cargo tank discharge valves with power actuators from the cargo control room and at the valve itself, and manually should the power actuators fail. • Understanding of the principles and operations of the LNG cargo loading/unloading systems safety features including quick-closing valves and high/low level alarms. Specific: • Knowledge of the vessel's cargo loading/unloading systems and the associated safety features. • Knowledge of the vessel's specified procedures for cargo handling operations.

TASK CODE: 1.4.5

WORKER FUNCTION LEVEL AND ORIENTATION						WORKER INSTRUCTIONS	GENERAL EDUCATIONAL DEVELOPMENT		
DATA	%	PEOPLE	%	THINGS	%		REASONING	MATH	LANGUAGE
2	15	2	80	1A	5	2	3	1	4

TASK CODE: 1.4.5

GOAL: Operate the Nuclear Power Plant	OBJECTIVE: Supervise and coordinate nuclear power plant operations

TASK: Notifies higher authority (bridge, Chief Engineer, Master) by telephone in accordance with ship's watchstanding procedures to ensure that all concerned are informed when the capabilities of the nuclear power plant are limited by equipment or system malfunctions.

PERFORMANCE STANDARDS	TRAINING CONTENT
DESCRIPTIVE: -Accurate and concise reports are made to appropriate personnel in a timely manner. NUMERICAL: -All significant changes in plant capabilities are reported to appropriate personnel without exception.	FUNCTIONAL: -How to use communication equipment. -Knowledge of watchstanding procedures. -Knowledge of nuclear power plant systems and the effect of these systems on ship's propulsion capabilities. SPECIFIC: -How to use plant communications equipment. -Knowledge of ship's watchstanding procedures. -Knowledge of ship's nuclear power plant systems. -Knowledge of ship's nuclear power plant equipment or system malfunctions effect on overall propulsion capabilities of the ship.

By going a step further, the Associates have identified some specific areas for improvement. However, again, the figure which should be compared are 98.1% reliability achieved versus a goal of 75%.

A detailed critique by the Associates is not usually given if there is reliability. In striving to meet the spirit and not just the letter of the study, the Associates have attempted to offer their suggestions for improvement. The overall work performed by the original raters was good. Our suggestions are aimed at moving closer to perfection since we recognize that safety is the most important factor in the tasks. This is the factor that caused us to go far beyond the normal work entailed in performing the reliability study.

5. TYPES OF CHANGES

The final section of this report consists entirely of a detailed list of the changes by task number.

TYPES OF CHANGES

Task No.	*Disagreement	**Agreement
APPENDIX A - Engineering Personnel of Nuclear Ships		
1.1.4		Orientation
1.1.6		Orientation; rewording
1.3.1		One 1-level; orientaiton
1.3.3		Rewording
1.3.4		One 1-level
1.3.5		Orientation
1.4.1	One 3-level	
2.2.1		Rewording
2.2.2	Rewrite - (two tasks)	
3.1.1		One 1-level
3.1.3		One 1-level
3.2.3		Orientation

*One or more 2-level changes/major orientation shift/rewrite
**One or more 1-level changes/minor orientation shift/rewording

TYPES OF CHANGES (cont'd)

Task No.	*Disagreement	**Agreement
APPENDIX B - Cargo Operations of a Liquefied Natural Gas Ship		
CO-		
I.B.12		Rewording
I.C.1		Orientation
I.C.3		Orientation
II.B.8		Rewording
II.B.12		Rewording
II.C.1		Orientation
II.C.3		Orientation
II.D.1	One 2-level	
II.E.1		Orientation; one 1-level
III.A.2		Orientation
III.F.3	One 2-level	"Things" Sub-Category
III.F.4	Three 2-level	
III.1.4	Rewrite	
IV.A.1	Two 2-level	
IV.B.1	Two 2-level	
IV.C.1	Two 2-level	
IV.D.1	Two 2-level	
IV.E.1	Two 2-level	
IV.F.1	Two 2-level	
IV.G.1	Two 2-level	
IV.H.1	Two 2-level	
IV.I.1	Two 2-level	
IV.J.1	Two 2-level	
IV.K.1	Two 2-level	
IV.L.1	Two 2-level	
V.B.2		One 1-level
V.B.4		Rewording
V.D.1		Two 1-level; orientation
V.E.1		Two 1-level; orientation
V.F.1		Two 1-level; orientation
VI.A.1		Two 1-level; orientation
VI.A.4	One 2-level	One 1-level
VI.A.5		Four 1-level; orientation
VI.B.1		Two 1-level; orientation
VI.B.4	Rewrite	
VI.B.5		Four 1-level; orientation
VI.C.1		Three 1-level; orientation
VI.C.3		Four 1-level; orientation
VII.A.2		One 1-level; orientation
VII.A.6	Rewrite; complete the ratings	
VII.B.2		Orientation

*One or more 2-level changes/major orientation shift/rewrite
**One or more 1-level changes/minor orientation shift/rewording

TYPES OF CHANGES (cont'd)

Task No.	*Disagreement	**Agreement
APPENDIX C - Cargo Operations of an Unmanned Liquefied Natural Gas Barge		
TM-		
I.A.3		Rewording
I.B.11		Rewording
I.C.1	Orientation	
I.C.3	Orientation	
II.A.2		Rewording
II.B.7	Rewrite	
II.B.11		Rewording
II.C.1		Orientation
II.C.3	Orientation	
II.D.1	One 2-level	
II.E.1	Orientation	
III.A.3	One 2-level	"Things" sub-category;orientation
III.D.4	Rewrite	
IV.A.1	Two 2-level	
IV.B.1	Two 2-level	
IV.C.1	Two 2-level	
IV.D.1	Two 2-level	
IV.E.1	Two 2-level	
IV.F.1	Two 2-level	
IV.G.1	Two 2-level	
IV.H.1	Two 2-level	
IV.I.1	Two 2-level	
IV.J.1	Two 2-level	
V.B.4	One 2-level	Two 1-level
V.D.1		Two 1-level; orientation
V.E.1		Two 1-level; orientation
V.F.1		Two 1-level; orientation
VI.A.1		Two 1-level; orientation
VI.A.4	One 2-level	One 1-level; orientation
VI.A.5		Four 1-level; orientation
VI.B.1		Two 1-level; orientation
VI.B.4	Rewrite	
VI.B.5		Four 1-level; orientation
VI.C.1	One 3-level	
VI.C.3		Four 1-level; orientation
VII.A.2		One 1-level; orientation
VII.A.6	Rewrite	
VII.B.2	Orientation	

*One or more 2-level changes/major orientation shift/rewrite
**One or more 1-level changes/minor orientation shift/rewording

TYPES OF CHANGES (cont'd)

Task No.	*Disagreement	**Agreement
APPENDIX D - Bridge Personnel on Tankers and Freighters		
I.A.5	One 2-level	Two 1-level; orientation
I.A.6	One 2-level	"Data" Sub-category
I.B.1	One 2-level or reword	
I.B.6		Orientation
I.B.7		Orientation
I.B.8		Orientation
II.A.1	Orientation	
II.A.5	Two 2-level	Two 1-level; orientation
II.B.4	Two 2-level	
II.A.6	Orientation	Four 1-level
II.A.8	One 2-level	One 1-level
II.B.8	One 3-level; orientation	Two 1-level
II.B.10	Orientation	
II.B.11	Orientation	One 1-level
II.C.4	Two 2-level	
II.C.10	Orientation	Two 1-level
II.C.12		Orientation
II.C.13	Orientation	One 1-level
II.D.4	Two 2-level	
II.D.13	Orientation	
II.D.14	Orientation	One 1-level
III.A.7	Two 2-level	
III.A.10	One 3-level; orientation	Two 1-level
III.A.12		Orientation
III.B.7	Two 2-level	
III.B.12	One 3-level; orientation	Two 1-level
III.B.14		Orientation
III.C.7	Two 2-level	
III.C.13	Orientation	
III.C.15	Orientation	
IV.A.7	Two 2-level	
IV.A.10	One 3-level; orientation	Two 1-level
IV.A.12		Orientation
IV.B.7	Two 2-level	
IV.B.12	One 3-level; orientation	Two 1-level
IV.B.14		Orientation
IV.C.7	Two 2-level	
IV.C.13	One 3-level; orientation	Two 1-level
IV.C.15		Orientation
V.A.4	Rewrite	
V.C.1	Rewrite	
V.C.2		Orientation

*One or more 2-level changes/major orientation shift/rewrite
**One or more 1-level changes/minor orientation shift/reword

TYPES OF CHANGES (cont'd)

Task No.	*Disagreement	**Agreement
APPENDIX E - Towboat Operators		
TOW-		
I.B.4	Two 2-level	
I.B.8		Orientation
I.C.4	Two 2-level	
I.C.10		Orientation
I.D.4	Two 2-level	
I.D.11		Orientation
II.A.7	Two 2-level	
II.A.13		Orientation
II.B.7	Two 2-level	
II.B.15		Orientation
II.C.7	Two 2-level	
II.C.16		Orientation
III.A.3		One 1-level; orientation
III.A.4	Rewrite	
APPENDIX F - Personnel Handling Ambient Pressure-Ambient Temperature Hazardous Chemical Cargo on a Tankership		
I.A.6		One 1-level; orientation
II.A.3	Rewrite	
II.A.4	One 2-level OR:	One 1-level
II.A.9		Rewording
II.A.12	Orientation	One 1-level
II.A.13	One 2-level	
II.A.16	One 2-level	One 1-level
II.A.19	One 2-level	
III.A.2		One 1-level; orientation
III.A.6	Orientation	
III.B.2		One 1-level
III.C.12		One 1-level
III.D.3	Orientation	One 1-level
V.A.1	Orientation	
V.A.2		Orientation
V.A.6		Two 1-level
V.B.2		"Things" sub-category; orientation
V.B.7		Two 1-level
V.C.1	Orientation	Three 1-level
V.C.2	Orientation	Three 1-level
V.C.3	Orientation	Three 1-level
V.D.1	One 2-level	Two 1-level

*One or more 2-level changes/major orientation shift/rewrite
**One or more 1-level changes/minor orientation shifty/reword

TYPE OF CHANGES (cont'd)

Task No.	*Disagreement	**Agreement
APPENDIX G - Personnel Handling High Pressure-Ambient Temperature Cargo on an Unmanned Barge		
II.A.2	One 2-level; orientation	
II.A.3	One 2-level; orientation	Four 1-level
II.A.6	Orientation	One 1-level
II.B.2	Orientation	
III.C.8		One 1-level
III.B.C		One 1-level
III.A.4	Orientation	
III.D.11		One 1-level
III.D.12	One 2-level	One 1-level
III.E.4	Orientation	
IV.A.1	Orientation	
IV.A.4		One 1-level
IV.A.6		Two 1-level
IV.B.1		One 1-level
IV.B.6		Two 1-level
IV.C.1	Orientation	Three 1-level
IV.C.2	Orientation	Three 1-level
IV.C.3	Orientation	Three 1-level
IV.D.1	One 2-level	

*One or more 2-level changes/major orientation shift/rewrite
**One or more 1-level changes/minor orientation shift/reword